

NEW SPECIES OF ECHEANDIA (LILIACEAE) FROM CENTRAL AMERICA

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The species proposed below will provide valid names for Flora Mesoamerica and floristic studies of the Mexican flora.

ECHEANDIA ALTIPTATENSIS Cruden, sp. nov.

Radicitubera juxta cormum. Scapus glaber, brevis vel brevissimus, internodio supero brevissimo, bracteis fere oppositis. Tepala flava, plerumque 13-18 mm longa, elliptica. Antherae liberae. Capsula oblonga.

Root-tubers close to corm, 1-2.5 cm long. Basal leaves 6-10(-13), lanceolate, falcate, ciliate, 4-15(-24) cm long, 4-9 mm wide. Scape(s) 1(2) glabrous, unbranched, 2-14 (25) cm high. Cauline leaves 0(1). Upper bracta nearly opposite. Flowers ± erect. Tepals yellow, elliptic, (11)13-18 mm long. Filaments linear, weakly scaled, 6-8 mm long. Anthers free, versatile, 2-3 mm long. Ovaries 2-4 mm long. Capsules 11-13 mm long, 5-6 mm wide. Chromosome number $n=24$ (Cruden 1585).

Type: GUATEMALA: HUEHUETENANGO: road to Todos Santos Cuchumatán, ca 5.5 km from RN 9 (at Paquix), 3300 m, 30 Jun 1969, Cruden 1585 (Holotype: UCI; Isotypes: BML, FI, GHI, MEXU!, MO!, NY!, US!).

Representative Specimens Examined: GUATEMALA: HUEHUETENANGO: Sierra de los Cuchumatanes: Llano de Tierra Blanca, 2.5 mi W Llano de San Miguel, ca 3500 m, 2 Aug 1960, Beaman 3963 (DUKE, GH, TEX, UC); SAN MARCOS: Las Ventanas, San José Ojetenam, 3440 m, 26 Aug 1977, Smith & Olson 749 (F); TOTONICAPÁN: Tecum Uman ridge, at K 154, RN 1, ca 20 km E Totonicapán, ca 3340 m, 14 Aug 1960, Beaman 4164 (GH, UC).

This diminutive species is endemic to the Sierra de los Cuchumatanes and other high-elevation sites in northwestern Guatemala. It is a plant of llanos, only occasionally encountered in the adjacent pine or juniper forest.

ECHEANDIA WILLIAMSII Cruden, sp. nov.

Radicitubera ab cormo 4 cm vel plus. Folia basalia denticulata vel breve ciliata. Folia caulina 2-6. Tepala flava ad crocea, elliptica. Filamenta antheris duplo vel plus longiora. Antherae liberae, lateraliter dehiscentes. Capsula oblonga, duplo vel plus longiora quam latiora.

Root-tubers numerous, probably 4 or more cm from corm. Basal leaves (5?)6-11, narrowly oblanceolate to oblanceolate, 20-60 cm long, 14-33 mm wide, densely denticulate to short ciliate, sometimes falcate. Scapes 67-150 cm, glabrous, usually branched. Cauline leaves 2-5(6). Flowers $\pm$ erect. Tepals yellow to orange, elliptic, 11-15(18) mm long. Filaments (6)7-8(10) mm long, linear and moderately scaled to narrowly clavate and heavily scaled. Anthers 2-3.6 mm long, free, dehiscing laterally, 1/2 the length of the filaments or less. Ovaries 2-3 mm long. Capsules (9)10-14 mm long, (4.5)5-6.5 mm wide, oblong, at least twice as long as wide. In flower Jul-Sep and (Nov-)Jan-early Apr (Alta Verapaz).

Type: HONDURAS: LEMPIRA: frecuente en el bosque abierto faldas, Montaña Puca, entre Guatán and Cuábanos, 1600 m, 25 Sep 1963, Molina 12947 (Holotype: FI; Isotype: NY!).

Representative Specimens Examined: GUATEMALA: ALTA VERAPAZ: Coban, 1350 m, Nov 1912, Türckheim 3993 (GH, U, US); GUATEMALA: 7 mi E Guatemala, 1840 m, 5 Jul 1970, Harmon & Fuentes 2929 (ENCB, MO); HUEHUETENANGO: between San Sebastián H. and large penasco above town, 2000-2200 m, 13 Aug 1942, Steyermark 50515 (F, GH); HONDURAS: OCOTEPEQUE: Quebrada Tinasa, between Sinuapa and La Providencia, 900 m, 29 Aug 1968, Molina R. 22373 (F).

In Chiapas and Guatemala there are four robust, free-anthered species. They are ecologically isolated and may have different chromosome numbers. E. williamsii is generally a plant of mesic sites in pine, pine-oak, or oak woods between 1300 and 2200 m and flowers in late summer and early fall (Jul-Sep). Plants in the Alta Verapaz flower from December into early April. It is characterized by relatively broad, ciliate leaves, anthers that dehisce laterally, and oblong capsules whose length is usually twice their width.

ECHEANDIA BREEDLOVEI Cruden, sp. nov.

Plantae robustae. Radicitubera ab cormo 2 cm, 6-8 cm longa. Scapus glaber. Tepala flava, elliptica, 9-12 mm longa. Filamenta antheris duplo vel plus quam duplo longiora, squamata, 4-6 mm longa. Antherae liberae, 2-3 mm longae. Capsula late oblonga.

Root-tubers 6-8 mm long, 2 cm from corm. Basal leaves broadly oblanceolate, falcate, 35-40 cm long, 20-23 mm wide, densely denticulate. Scape glabrous, 65-75 cm high, branched. Cauline leaves 3-4. Flowers $\pm$ erect. Tepals yellow, elliptic, spreading, 9-12 mm long. Filaments 4-6 mm long, linear, light-moderately scaled. Anthers free, 2-3 mm long, dehiscing laterally. Ovaries 1-1.5 mm long. Capsules 8-13 mm long, 4.5-6 mm wide, for most length twice the width or less. In flower late Sep-Dec.

Type: MEXICO: CHIAPAS: Mirador for Chicoasén Dam, rd from Tuxtla Gutiérrez to the Chicoasén dam, Municipio San Fernando, 850 m, 17 Nov 1976, Breedlove 41481 (Holotype: DSI!).

Additional Specimens Examined: MEXICO: CHIAPAS: Municipio San Fernando, 4-6 km W Mirador Los Chiapas, Parque Nacional del Sumidero, 1180-1240 m, 14 Nov 1984, Davidse, Sousa, Téllez, Martínez, & Davidse 29718 (MO); Municipio Suchiapa, 15 km SW Suchiapa, 750 m, 26 Sep 1972, Breedlove 28092 (DS); OAXACA: Distrito Juchitán, 14 km N Ventosa, rd to Matías Romero, 12 Dec 1980, Trigos & Lorence 528 (CAS).

This species occurs up to 1200 m in tropical deciduous vegetation on the Isthmus of Tehuantepec and the area drained by the Río Mezcalapa and Río Chiapa. The highly branched plants flower late in the year, and are characterized by their relatively small flowers and capsules, and anthers that dehisce laterally.

ECHÉANDIA CHIAPENSIS Cruden, sp. nov.

Radicitubera ab cormo 3-6 cm. Folia basalia plerumque linearia, denticulata, raro serrulata vel breve ciliata. Folia caulina (4)5-11. Tepala flava, elliptica. Filamenta squamosa. Antherae liberae, graciles, ab imo ad apicem decrescentem, ad apicem dehiscentem. Capsula late oblonga.

Root-tubers 2-4 cm long, 3-6 cm from corm. Basal leaves 25-65 cm long, (6)9-20(29) mm wide, linear, rarely broadly linear, denticulate (serrulate, short-ciliate). Scape 69-160 cm high, glabrous, usually branched. Cauline leaves (4)5-11. Flowers $\pm$ erect. Tepals yellow, elliptic, spreading, 11.5-17 mm long. Filaments (4.5)5-7(8) mm long, linear-narrowly clavate, scaled. Anthers free, 4-5(5.5) mm long, slender and usually tapered from base to tip, dehiscent apically. Ovaries 2.5-3(3.5) mm long. Capsules 7-11 mm long, 4.5-6 mm wide, length less than twice the width. In flower (Aug)Oct-Dec. Chromosome number $n=8$ (Cruden 1916).

Type: MEXICO: CHIAPAS: Ruta 190, 2.4 km E Tapanatepec, grassy slopes in oak woodland, 340 m, 30 Aug 1971, Cruden 1916 (Holotype: UC!; Isotypes: BM!, ENCB!, GH!, MEXU!, MO!, US!).

Representative Specimens Examined: MEXICO: CHIAPAS: ridge back of Tonalá, 1200-2500 ft, 10 Aug 1895, Nelson 2900 (GH, US); Municipio Amatenango Frontera: Río Cuilco between Nuevo Amatenango and Frontera Comalapa, 1100 m, 22 Nov 1976, Breedlove 41783 (DS); Municipio Ocozocoautla de Espinosa: 3 km N Ocozocoautla, rd to Mal Paso, 900 m, 5 Nov 1971, Breedlove & Smith 21957 (DS, MO); OAXACA: District Tuxtepec, vicinity Chiltepec, 20 m, Jul 1940-Feb 1941, Martínez-Calderón 132 (GH, US).

This species is known primarily from lower elevations (300-1100 m) in the Sierra Madre de Chiapas, where it is found in drier habitats, including grassy openings in oak and pine-oak woodlands, thorn forest, and cliff faces and steep slopes in seasonal evergreen forest. The slender, tapered anthers, which dehisce apically, and numerous slender cauline leaves are diagnostic.

ECHEANDIA MATUDAE Cruden, sp. nov.

Radicitubera ab cormo 3-8 cm. Scapus glaber, (53)65-170 cm altus. Folia caulina (3?)4-6(7). Tepala flava, elliptica. Filamenta squamata, antheris plerumque minus quam duplo longiora. Antherae liberae, apicibus dehiscentibus. Capsula anguste oblonga, longitudo latitudine duplo vel plus longiora quam latiora.

Root-tubers 2-4 cm long, 3-8 cm from corm. Basal leaves 27-75 cm long, 8-22 mm wide, linear, denticulate or serrulate (short-ciliate). Scape (53)65-170 cm high, glabrous, usually branched. Cauline leaves (3?)4-6(7). Flowers $\pm$ erect. Tepals 11-16 mm long, elliptic, yellow (white). Filaments (5)5.5-7(8) mm long, linear-narrowly clavate, scaled. Anthers free, 3-4.1(5) mm long, dehiscing apically. Ovaries 2-3 mm long. Capsules 9-13.5 mm long, 4-5.5 mm wide, oblong, length twice the width or more. In flower (Feb) Aug-Nov. Chromosome number $n=16$ (Cruden 1215).

Type: MEXICO: CHIAPAS: Ruta 190, 1.5 mi E Escopetazo, 1570 m, 20 Aug 1966, Cruden 1215 (Holotype: UCI; Isotypes: BMI, ENCB!, FI, GH!, MEXU!, MO!, NY!).

Representative Specimens Examined: EL SALVADOR: SAN SALVADOR: Los Planes Renderos/Cerro Chula, 1050 m, El Salvador 934 (MO); SANTA ANA: Hda. San José, N Metapán, 850 m, Instituto Tropical Investigaciones Científicas San Salvador 925 (MO); GUATEMALA: ALTA VERAPAZ: nr Tactic, 4500 ft, 16 Feb 1941, Hunnewell 17107 (GH); HUEHUETENANGO: nr El Reposo, 900-1000 m, 14-18 Dec 1972, Williams, Molina R. & Williams 41357 (F); JALAPA: rd between Jalapa and San Pedro Pinula, 1400-1800 m, 12 Nov 1940, Standley 77102 (GH); MEXICO: CHIAPAS: Municipio Tenejapa: paraje Mahbenchauk, barrio Tih Ha', 3600 ft, 28 Oct 1966, Ton 1398 (DS, DUKE, MICH).

This is primarily a mid-elevation (1000-1800 m) species of oak and pine-oak-Liquidamber woods of the mountains of central Chiapas, central Guatemala, and western El Salvador. The anthers dehisce apically. The other upland species, E. williamsii, occurs in pine, pine-oak, and oak woods, and has anthers that dehisce laterally.

ECHEANDIA PETENENSIS Cruden, sp. nov.

Radicitubera ab cormo 2-9 cm. Folia basalia anguste oblanceolata, marginibus denticulatis vel breviciliatis. Folia caulina 3-4. Tepala alba, anguste elliptica, 9-11 mm longa. Filamenta linearia, squamosa. Antherae connatae; conus gracilis, minus quam 1.5 mm diametro, ad apicem 0.4-0.6 mm latus. Capsula globosa ad late oblonga.

Root-tubers 2-9 cm from corm, 1.5-3 cm long. Basal leaves narrowly oblanceolate, 20-55 cm long, 7-12(-15) mm wide, denticulate to short-ciliate. Scapes glabrous, 56-110 cm high, usually branched. Cauline leaves 3-4, lowest to 5 cm long, others greatly reduced.

Flowers pendulous. Tepals white, narrowly elliptic, 9-11 mm long. Filaments linear, scaled, 3-4 mm long. Anthers 4.5-6 mm long, connate; cone slender, less than 1.5 mm across, 0.4-0.6 mm wide at apex. Ovaries 1.7-2 mm long. Capsules globose to broadly oblong, 4.5-7.5 mm long, 4.5-5.5 mm wide. In flower Jun-Oct.

Type: GUATEMALA: PETEN: La Libertad and vicinity, 17 Jun 1934, Aguilar H. 305 (Holotype: FI; Isotypes: MICH!, MO!, NY!).

Additional Specimens Examined: BELIZE: EL CAYO: Augustine, Mountain Pine Ridge, rd to resthouse (16°34' N, 88°54' W), 1500 ft, 11 Oct 1959, Hunt 109 (BM, US); TOLEDO: Cow Pen, nr Monkey River, 7 Jul 1942, Gentle 4049 (F, GH, LL, MO, MICH, NY, US).

This is one of three species endemic to the Yucatan Peninsula. It occurs between 100 and 500 m. The narrow basal leaves and white flowers distinguish it from the broader leafed E. luteola (cream-colored flowers) and E. campechiana (yellow flowers).

ECHEANDIA MOLINAE Cruden, sp. nov.

Radicitubera non videtur. Folia basalia anguste lanceolata, denticulata. Folia caulina 2-3. Tepala luteola, anguste elliptica. Filamenta linearia, glabra. Antherae connatae.

Root-tubers not seen, but probably some distance from corm. Basal leaves 4-8, 40-50 cm long, 3.5-11 mm wide, narrowly lanceolate, denticulate. Scape 90-105 cm high, glabrous, branched. Cauline leaves 2-3, lower to 21.5 cm long. Flowers nodding to pendulous. Tepals pale yellow, narrowly elliptic, 8-9 mm long. Filaments 3-4 mm long, linear, smooth. Anthers 4-4.5 mm long, connate. Ovary 1 mm long. Capsule 6-7.5 mm long, 4-4.5 mm wide. In flower Sep-Oct.

Type: GUATEMALA: BAJA VERAPAZ: rocky slopes, cutover forest of Cachil, 1500 m, 3 Oct 1972, Molina & Molina 27835 (Holotype: FI; Isotype: UI).

This species is known only from the type collection. It is characterized by its pale yellow flowers and smooth filaments.

ECHEANDIA LUTEOLA Cruden, sp. nov.

Radicitubera ab cormo 3-10 cm. Folia basalia anguste lanceolata, marginibus breviciliatis. Tepala luteola vel crenea, anguste elliptica. Filamenta squamosa. Antherae connatae.

Root-tubers 3-10 cm from corm, 2.5-4 cm long. Basal leaves narrowly lanceolate, falcate in some, 21-75 cm long, 7-30 mm wide, short ciliate. Scape glabrous, 0.6-1.8 m high, branched. Cauline leaves (3-)6-9, reduced upwards to bracts, the lower to 33 cm long. Flowers nutant to pendulous. Tepals pale yellow or cream, 7.5-9 mm long, narrowly elliptic, reflexed, inner ca 2 mm wide, outer ca 1 mm

wide. Filaments linear to narrowly clavate, scaled, 3-4 mm long. Anthers 4.5-5.5 mm long, connate; the cone not strongly tapered. Ovaries 1-2 mm long. Capsules broadly oblong, 6-8 mm long, 4-5 mm wide. In flower Jun-Aug. Chromosome number $n=32$ (Cruden 1907, 1910).

Type: MEXICO: YUCATAN: Ruta 180, K 110-111, ca 7 km NW Chichén-Itzá, roadside in tropical deciduous forest, 10-20 m, 27 Aug 1971, Cruden 1909 (Holotype: UCI; Isotypes: ENCB!, FI!, GH!, KI!, MEXU!).

Representative Specimens Examined: BELIZE: EL CAYO: Mountain Pine Ridge, San Agustín, Jul-Aug 1936, Lundell 6622 (MICH); MEXICO: CAMPECHE: Ruta 269, K 67-70, at Pomuch, ca 39 km N Ruta 180, 10-20 m, 28 Aug 1971, Cruden 1910 (K, MEXU, UC); YUCATAN: Chichén-Itzá, 10-20 m, 27 Aug 1971, Cruden 1907 (ENCB, UC); Maxcanú, 14 Sep 1865, Schott 634 (BM); QUINTANA ROO: Cobá, Jun-Jul 1938, Lundell & Lundell 7840 (MICH).

The pale yellow or cream-colored flowers are relatively small, and open in early afternoon. The scaled filaments distinguish it from the previous species. The only other species in the region with fused anthers is E. petenensis, which has white flowers. Without flowers this species is indistinguishable from E. campechiana.

ECHEANDIA CAMPECHIANA Cruden, sp. nov.

Radicitubera ab corno 4-9 cm. Folia basalia 8-12, anguste oblanceolata, marginibus denticulatis. Scapus glaber. Folia caulina 3-7. Tepala flava, anguste elliptica, 8-11 mm longa, valde reflexa. Filamenta linearia, squamosa. Antherae liberae. Capsula non videtur.

Root-tubers 4-9 cm from corm, 2.5-4 cm long, non-tuberous part thick relative to other species. Basal leaves 8-12, narrowly oblanceolate, 35-65 cm long, (16-)20-35 mm broad, denticulate. Scape glabrous, 0.9-1.5 m high, branched. Cauline leaves 3-7, gradually decreasing in size upwards, lowest 13-23 cm long. Tepals 8-11 mm long, narrowly elliptic, inner to 3.5 mm wide, outer to about 2 mm wide, strongly reflexed, yellow. Filaments 5.5-6.5 mm long, linear, with few, small scales to many well developed scales, inserted between the bases of the anther sacs, the point of insertion not visible from the side. Anthers 2.7-3.5 mm long, free, dehiscing through an obovate opening at the apex of each anther sac. Ovaries 2-4 mm long. In flower Aug-Sep. Chromosome number $n=24$ (Cruden 1906, 1911).

Type: MEXICO: CAMPECHE: rocky area with various grasses and composites, Ruta 180, K 10-11, ca 10.4 km E Campeche, 30-40 m, 26 Aug 1971, Cruden 1906 (Holotype: UCI; Isotypes: ENCB!, FI!, GH!, KI!, US!).

Additional Specimens Examined: MEXICO: CAMPECHE: Ruta 180, ca 6.2 km E Campeche, 28 Aug 1971, Cruden 1911 (MEXU, UC).

ECHEANDIA PITTIERI Cruden, sp. nov.

Radicitubera juxta cormum. Scapus glaber. Folia basalia 8-11, anguste lanceolata. Folia caulina 3. Tepala alba. Filamenta recta, glabra. Antherae connatae. Capsula subglobosa 6.5-7.5 mm longa.

Root-tubers 1-1.5 cm long, 1.5-2 cm from corm. Basal leaves 8-11, (18-)29-41 cm long, (4-)11-20 mm wide, narrowly lanceolate, entire or short-ciliate. Scape 80-115 cm high, glabrous, branched. Cauline leaves 3. Tepals 10-12.5 mm long, to 2 mm wide, narrowly elliptic, white. Filaments 3-4.5 mm long, linear, smooth. Anthers 5.5-7 mm long, connate, yellow. Ovaries 2-3 mm long. Capsules 6.5-7.5 mm long, 5 mm wide. In flower late Jul-Aug.

Type: PANAMA: CHIRIQUI: 5 mi S Boquete toward David, in savanna near rocky creek, 2800 ft, 26 Aug 1965, McDaniel 6810 (Holotype: MO!; Isotype: DUKE!).

Additional Specimens Examined: COLUMBIA: MAGDALENA: ridge E Manaure, 1500 m, 3 Sep 1944, Haught 4342 (US); VALLE DEL CAUCA: Cordillera Occidental, Hoya del Río Sanjuniquín, Naranjal, 1200 m, 8 Dec 1943, Cuatrecasas 15356 (US); PANAMA: CHIRIQUI: vicinity Boquete, Llanos Francia, 3300 ft, 25 Jul 1959, Stern, Chambers, Dwyer, & Ebinger 1166 (MO).

This species differs from E. leucantha Klotzsch (= E. proluxa Woodson), which has scaled filaments and tubers that develop well away from the corm.

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NEW COMBINATIONS IN ECHEANDIA AND HAGENBACHIA (LILIACEAE)

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The new combinations proposed below are made at this time to provide names for studies of the flora of Mexico and Central America. Critical synonyms are given to clarify my concept of various taxa.